

## **EPA Comment follow-up on Background Investigation SAP, Columbia Falls**

CFAC/Roux responses prepared on August 17, 2018 and provided in blue.

**Background Reference Location #2:** Roux's 7/18/18 email provided three alternate background areas as a replacement for the proposed background reference location #2. In this email, Roux recommended alternate location #1 as the replacement background area. EPA has reviewed these three alternate background locations and concludes alternate location #1 and alternate location #3 are good candidates; however, each location has potential drawbacks. As Roux noted, alternate location #1 is downwind of the site and outside the Flathead Valley. Alternate location #3 is within the Flathead Valley but is downstream of the site (and downstream of the publicly owned treatment works [POTW] discharge point for Columbia Falls). In that regard, EPA agrees alternate location #1 is the preferred location. However, because this location is not within the Flathead Valley, there is concern the minerology may not be representative of site conditions. Therefore, EPA recommends also sampling at alternate location #3.

CFAC/Roux agree to collect surface soil samples from 10 locations in both Alternate Background Area #1 and #3 (for a total of four reference areas and 40 surficial soil samples). This satisfies USEPA's concern for only sampling a location with potential mineralogical differences in the reference area outside the Flathead Valley, or only sampling a downstream reference area with potential impacts from other upstream sources; and removes the need to negotiate a new reference area even further from the Site which would result in additional costs for reconnaissance and research, costs associated with preparing additional comments and responses, and would significantly impact the schedule (currently scheduled to start soil sampling in late September). The addition of this fourth reference area at a further upwind distance from the Site, will also provide additional data for comparison to the Site and reference areas closer to the Site. The Background SAP will be revised to include sampling in the additional reference area.

**Comparisons to Other Background Soil Datasets:** EPA agrees it is useful to employ other background soil datasets, such as the Montana Background soil dataset, to ensure the measured site-specific soil dataset is within the expected background range. In that regard, the native soil data presented in Smith et al. (2016)<sup>1</sup> can also be used to provide a frame of reference. If the site-specific dataset is higher than these other background datasets, this may indicate the site-specific background reference area(s) are impacted and not appropriate for use. Any subsequent documents that rely upon background soil data should include a discussion of the outcome of comparisons to other background datasets.

Background soil data generated as part of the background investigation will be compared to other background soil datasets, including the dataset from the Montana Background Soils Investigation (MBSI) (Hydrometrics, 2013), and the native soil data presented in Smith et al. (2016), for perspective on how the Site-specific background dataset compares to the range of the regional datasets.

It should be noted that the Background Study is intended to generate a Site-specific background dataset which should be relied upon as a representative background dataset more so than a state-wide or nation-wide dataset. In prior data summary reports, regional background datasets were dismissed as unrepresentative for the sole background comparison to Site soils, which is a primary reason for conducting this Background Study.

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<sup>1</sup> <https://pubs.usgs.gov/ds/801/>

Roux agrees that any subsequent documents that relies upon background soil data should include a discussion of the outcome of comparisons to other background datasets. This response will be incorporated into the revised Background SAP.

**Aerial Deposition Impacts:** Based on a review of the windrose, and in consideration of the fact the area is subject to inversions, it is possible the background areas for soil are influenced by site-related aerial deposition. To address this potential issue, it is recommended the soil sample collection methods be modified to include the collection of two depth intervals for each sampling location – 0 to 2 inches below ground surface (bgs) and 2 to 6 inches bgs. Prior to use in making background soil comparisons to site, the chemical concentrations for these two soil depth intervals should be compared to determine if the 0-2-inch interval is statistically higher than the 2-6-inch interval. If the 0-2-inch interval is higher, it is recommended any background soil comparisons employ only the 2-6-inch interval dataset. If the two depth intervals are not statistically different, the results for each depth interval can be combined (using appropriate weighting) to represent the sampling location.

It is the opinion of CFAC/Roux that the initially proposed surficial 0-0.5 ft interval should be collected at each background soil sample location and once the study is complete, the results should be evaluated following the approach presented in the draft Background SAP as modified based upon proposed additional considerations and the flow chart presented in Roux's responses to USEPA comments. It is premature to determine if additional vertical characterization (i.e., 0-2 inches; 2-6 inches) is necessary at any, let alone all, of the reference areas, or for which COPCs, without review and evaluation of the initial sampling results.

**Soil Type Maps:** Both the simple surficial geology map (Figure 3) and the United States Department of Agriculture Natural Resources Conservation Service (NRCS) soil type map (Figure 4) should be retained and presented in the SAP. The SAP should also include the table, which was provided with the response to comments, illustrating how the various NRCS soil types were combined for the purposes of characterizing the three site soil types. EPA agrees that, for the purposes of identifying candidate background areas, the focus can be on the surficial geology map, with a discussion of the NRCS soil type comparisons to surficial geology and how they were used. Also, the surficial geology map should replace the NRCS soil map as the background for Figure 6.

Figure 6 was revised during the prior round of comments to include the NRCS soil map from Figure 4 as the background for Figure 6, as requested by USEPA in their comments dated May 25, 2018. If preferred by USEPA (as suggested by the current comment), the figure will be revised to include the surficial geology map from Figure 3.

**Approach for small home range ecological receptors:** Roux's 7/16/18 memorandum provided a proposed approach for comparing onsite soil datasets for small home range ecological receptors to background in which the maximum concentration for the exposure area is compared to the background threshold value (BTV), which is estimated as the 95% upper confidence limit on the 95<sup>th</sup> percentile (UTL95-95). If the maximum concentration is higher than the BTV, Roux proposed to compare individual samples within the exposure area will be compared to the BTV to identify which locations have concentrations higher than background. EPA agrees with this proposed approach.

Roux has no further response.

**Approach for establishing substantial difference in Form 2 background hypothesis testing:** Roux's 7/16/18 memorandum proposed to base the substantial difference 'S' upon a proportion of the background sample variability (standard deviation) and proposed proportion value of 1.3, stating this value corresponds to the 90<sup>th</sup> percentile for a normal distribution. EPA agrees the approach of setting S based upon a proportion of the background sample variability (standard deviation) is consistent with EPA guidance. However, the logic in selecting the proportion value of 1.3 appears potentially flawed. While it is true a z-score of 1.3 corresponds to the 90<sup>th</sup> percentile, this presumes the distribution of background soil concentrations are normal. Experience has shown concentration distributions for environmental media are usually not normal but are skewed (e.g., lognormal, gamma) or do not follow a discernable distribution. If the 90<sup>th</sup> percentile is desired as the basis of establishing S, then the approach presented in Section A.2.2 of EPA's background guidance<sup>2</sup> (EPA 2002) may more appropriate to adopt. Note that, when S is based on a statistic derived from the background distribution (e.g., mean, standard deviation, percentile), the background dataset should be free from potential outliers. Please review the proposed approach and determine if Roux desires to change the approach in light of these considerations.

CFAC/Roux propose to base the substantial difference, S, upon a proportion of the background sample variability (i.e., standard deviation) as presented in Section A.2.3 of the USEPA background guidance (USEPA 2002). The proposed proportion for these analyses is 1.3, which is the optimal value for minimizing the proposed substantial difference while ensuring that the desired confidence and power are achieved when conducting the two-sample hypothesis testing using Background Test Form 2. No assumption regarding the distribution of the background soil concentrations was presumed in selecting this proportion.

Reference to the z-score corresponding with the 90<sup>th</sup> percentile of a normal distribution was included to provide a point of comparison for the proposed proportion of the sample variability. CFAC/Roux does not contend with EPA's statement that many concentration distributions for environmental media are skewed or nonparametric. Although the proposed proportion of 1.3 corresponds with a range of percentiles in skewed distributions, the stricter burden of proof associated with the Test Form 2 compared to that of the Test Form 1 minimizes the likelihood of erroneously concluding that the sample area does not exceed background concentrations by a substantial difference when it actually may, while permitting a larger value for a substantial difference (USEPA 2002).

**Background comparison flow diagram:** Roux's 7/16/18 memorandum provided a proposed a modified flow diagram to illustrate the process for performing site vs. background comparisons. EPA agrees with this proposed flow diagram.

Roux has no further response.

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<sup>2</sup> <https://www.epa.gov/sites/production/files/2015-11/documents/background.pdf>